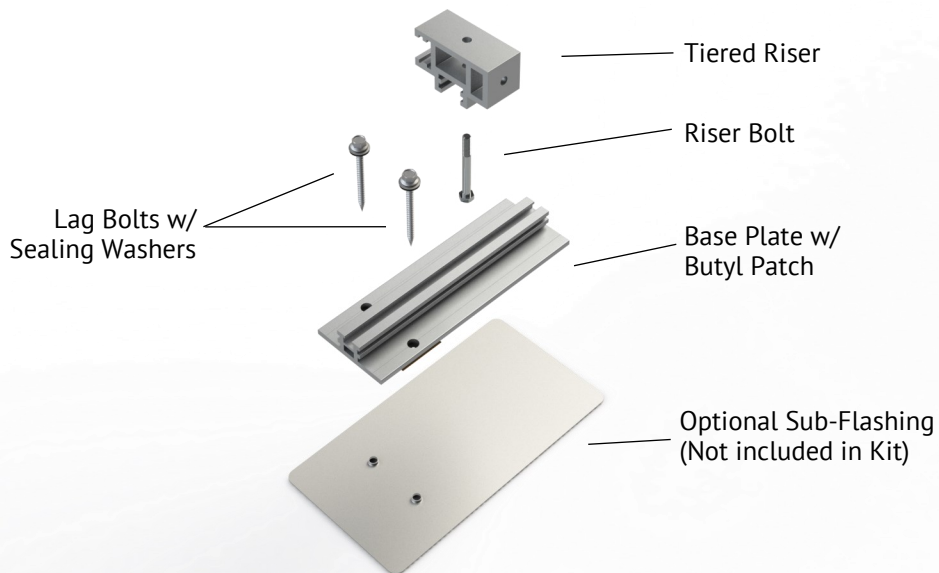
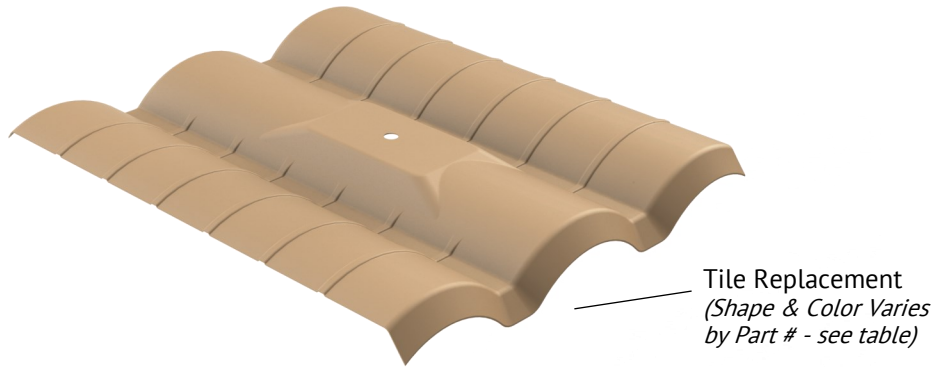
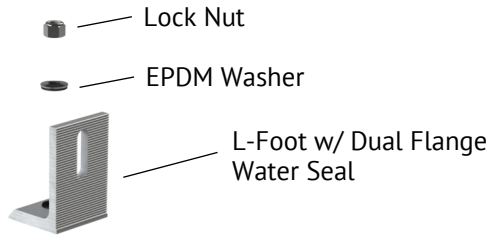


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• Tile Configurations	6
• Design Rules	7
• Pressure Tables	8
• Detail Drawings	17



TECHNICAL SPECIFICATIONS

MATERIAL TYPES

All Extruded Components:
6005A-T61 or 6061-T6 Aluminum

Tile Flashing & Subflashing (Optional):
5000 Series Aluminum Sheet

Hardware: 300 Series Stainless Steel

TOOLS REQUIRED OR RECOMMENDED FOR LAYOUT:

- Marker/Crayon
- String Line
- Measuring Tape
- Drill
- Pilot Drill Bit
- Ratchet/Driver—1/2"

SAFETY: All applicable OSHA safety guidelines should be observed when working on a PV installation job site. The installation and handling of PV solar modules, electrical installation, and PV racking systems involves handling components with sharp metal edges. Rules regarding the use of gloves and other personal protective equipment (PPE) should be observed,

PART #	TILE SHAPE	TILE COLOR
004TRFA	Flat	Adobe
004TRFD	Flat	Charcoal
004TRFM	Flat	Mill
004TRSA	Spanish	Adobe
004TRSD	Spanish	Charcoal
004TRSM	Spanish	Mill
004TRWA	W	Adobe
004TRWD	W	Charcoal
004TRWM	W	Mill

TILE REPLACEMENT CAPACITIES AND ENGINEERING

Refer to engineering report tables for tested allowable loads. Refer to local AHJ to determine the correct code (ASCE 7-05 or 7-10), wind speed and snow load. It is the responsibility of the installer to ensure these mounting attachments are appropriate for the application. Please contact your 3rd party engineer for more information.

ENGINEERING GUIDE LIMITATIONS

- Flush roof installations only
- Roof slope must be 0-45 degrees (0/12 - 12/12 pitch)
- Surrounding ground area must not slope more than 10 degrees
- Location must fall into Exposure Category B or C

Please refer to the Solarmount Installation Manual for proper installation of the Solarmount system. Unirac Flashkit Tile Replacements are intended to replace L-feet in the system and the rail connection should be torqued to the appropriate L-foot to rail torque specification from the Solarmount Manual.

Please refer to www.unirac.com in the Technical Support section for the Solarmount D&E guide which should be used in installations that do not comply with the limitations above.

FIGURE 1: Lag pull-out (withdrawal) capacities (lbs) in typical roof lumber (ASD)

	Specific Gravity	Lag Screw Specifications 5/16" shaft,* per inch thread depth
Douglas Fir, Larch	0.50	266
Douglas Fir, South	0.46	235
Engelmann Spruce, Lodgepole Pine (MSR 1650f & higher)	0.46	235
Hem. Fir, Redwood (Close Grain)	0.43	212
Southern Pine	0.55	307
Spruce, Pine, Fir	0.42	205
Spruce, Pine, Fir (E of 2million PSI & higher grades of MSR & MEL)	0.50	266

SOURCES: AMERICAN WOOD COUNCIL, NDS 2005, TABLE 1

Figure 1 (for reference only) Refer to latest AWC, NDS data to select a lag bolt embedment depth to satisfy your Uplift Point Load Force (lbs), requirements. It is the installer's responsibility to verify that the substructure and attachment method is strong enough to support the maximum point loads calculated.

NOTES:

- (1) Thread must be embedded in the side grain of a rafter or other structural member integral with the building structure.
- (2) Lag bolts must be located in the middle third of the structural member.
- (3) This table does not include shear capacities. If necessary, contact a local engineer to specify lag bolt size with regard to shear forces.
- (4) Install lag bolts with head and washer flush to surface (no gap). Do not over torque.
- (5) Withdrawal design values for lag screw connections shall be multiplied by applicable adjustment factors if necessary. See table 10.3 in the American Wood Council NDS for Wood Construction



LAYOUT:

Locate rail attachment locations and remove corresponding tile that will be replaced by Unirac Tile Replacement.



LOCATE RAFTER & DRILL PILOT:

Locate rafter where tile was removed and align tile replacement base mounting holes over rafter and vertically. Mark and drill pilot holes.



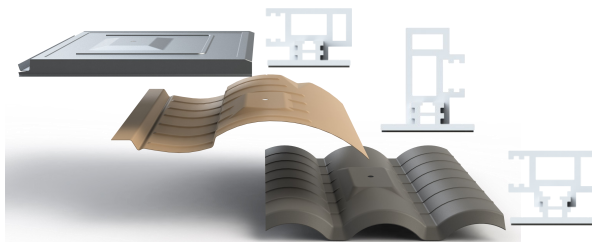
PREPARE UNDERLAYMENT & BUTYL:

Clear any pilot hole debris from underlayment and peel to remove sealing patch release liner.



INSTALL BASE:

Optional: Place Tile Replacement Sub Flashing. Align base over pilot holes and install base using supplied lag screws and sealing washers.



RISER CONFIGURATION:

The Universal Tile Base can be configured for all three tile types. *See: Tile Configurations Page*



PREPARE RISER:

Assemble tile replacement riser and bolt using the correct configuration for tile type.

(Can be completed before Base Installation; S-Tile Configuration Shown)



PLACE RISER:

Position riser on correct mating rail surfaces of base for tile type. Rotate bolt to slide as necessary. Align position of riser with crown of tile course.

(Can be completed before base installation; S-Tile Configuration Shown; See Also: Riser Configuration)



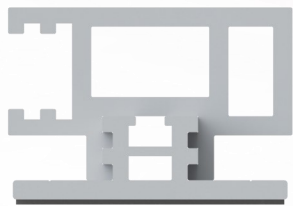
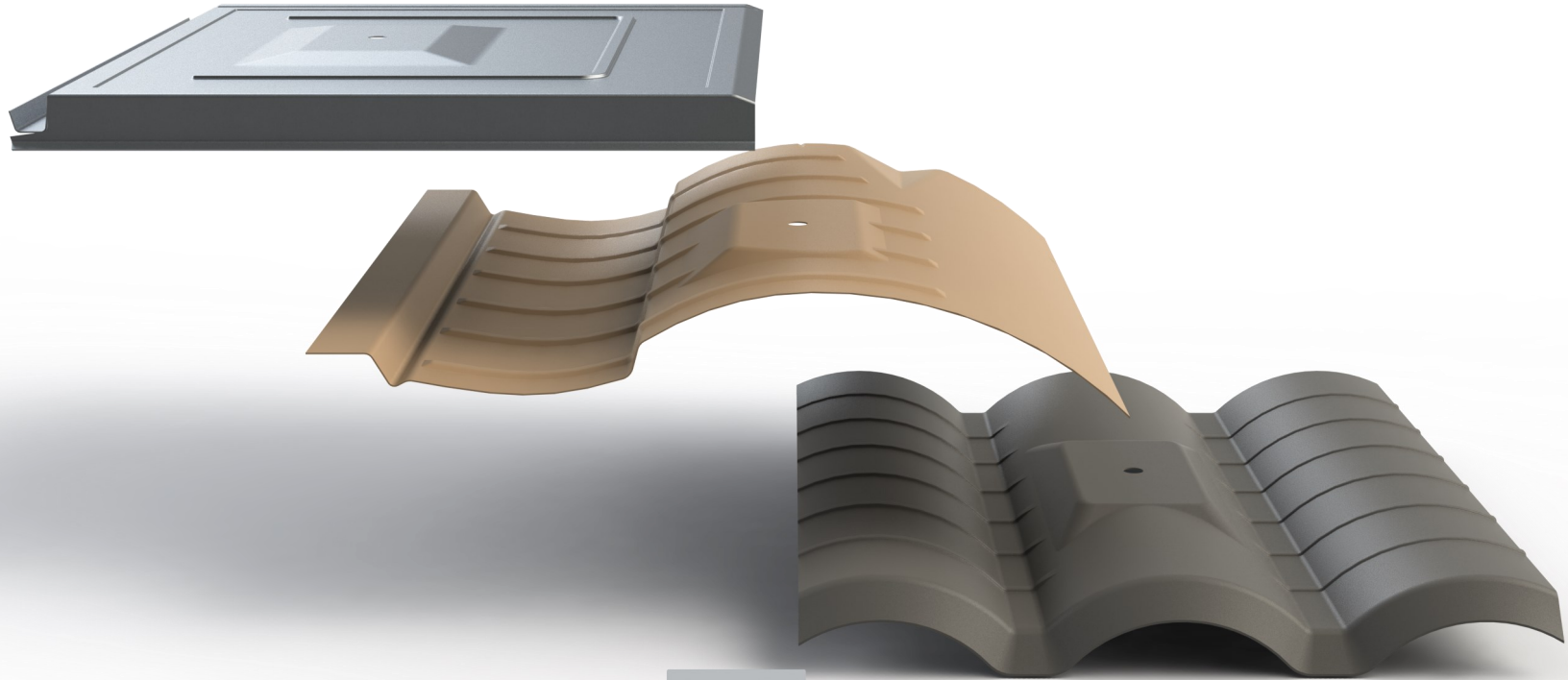
INSERT TILE FLASHING:

Lift upslope and adjacent tile to insert tile flashing into tile course. Position replacement flashing over riser and insert into replacement flashing. Riser can be freely slid to position with mating flashing hole.



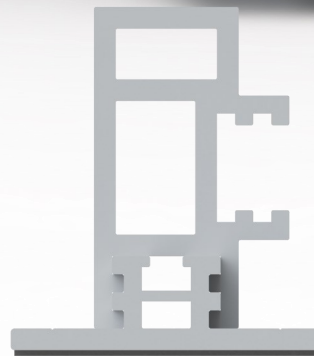
ATTACH L-FOOT:

Install sealing L-Foot, Washer and Locknut. Fastening assembly locks flashing, riser, and base together to achieve full capacity. Tighten to 20ft-lbs torque.



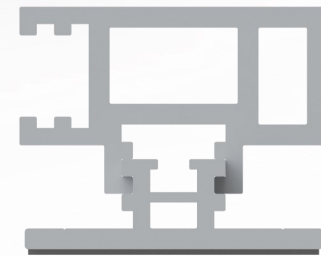
FLAT

Set the Tiered Riser in a horizontal orientation and to its lowest height setting on the Base Plate to mount Flat Tile Replacements.



S-TILE

Set the Tiered Riser in a vertical orientation and to its tallest height setting on the Base Plate to mount Spanish Tile Replacements.



W-TILE

Set the Tiered Riser in a horizontal orientation and to its middle height setting on the Base Plate to mount W-Shaped Tile Replacements.

Allowable Spans (in.)	Pressure Limits (psf)					
	Portrait Modules*			Landscape Modules*		
	Up	Down	Downslope	Up	Down	Downslope
72	31.1	43.2	16.0	51.2	71.3	26.3
60	37.3	51.9	19.1	61.5	85.6	31.6
48	46.6	64.8	23.9	76.9	107.0	39.5
36	62.1	86.4	31.9	102.5	142.6	52.6
24	93.2	129.7	47.9	153.7	213.9	78.9
12	186.4	259.3	95.7	307.5	427.9	157.9

ASSUMPTIONS & USE DETAILS:

- Pressure Limits refer to Up, Down, Downslope, and Lateral PSF
- Pressure Limits apply to all roof zones
- See Pressure Table Appendix for representative geographic pressures or refer to Unirac Pressure Tables for Flush Mounted Systems on Unirac.com

LOAD CAPACITIES:

	Allowable	Ultimate
• Tension Up	631 lbs	1433 lbs
• Compression Down	878 lbs	2285 lbs
• Downslope	324 lbs	803 lbs
• Axial	473 lbs	1163 lbs

*PRESSURE LIMIT MODIFICATION GUIDELINES:

- Portrait Module Height 65 inches
- Landscape Module Width 39.4 inches
- Pressure Limits provided may be linearly interpolated
- To Modify:
 - For Portrait Modules: multiply given pressure limit by (65"/ New Module Height)
 - For Landscape Modules: multiply given pressure limit by (39.5/ New Module Width)

Roof Pitch	Bldg. Height = 15 ft.						Bldg. Height = 30 ft.						Bldg. Height = 60 ft.						
	Up Pressures (psf)			Down (psf)			Up Pressures (psf)			Down (psf)			Up Pressures (psf)			Down (psf)			
	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	
1:12	-9.7	-18.5	-29.5	15.1	-9.7	-18.5	-29.5	15.1	-9.7	-18.5	-29.5	15.1	-12.1	-22.8	-36.1	15.1	-12.1	-22.8	-36.1
2:12	-8.7	-17.4	-27.3	14.7	-8.7	-17.4	-27.3	14.7	-8.7	-17.4	-27.3	14.7	-10.8	-21.5	-33.5	14.7	-10.8	-21.5	-33.5
3:12	-8.8	-17.5	-27.4	14.3	-8.8	-17.5	-27.4	14.3	-8.8	-17.5	-27.4	14.3	-10.8	-21.5	-33.5	14.3	-10.8	-21.5	-33.5
4:12	-8.8	-17.5	-27.4	13.6	-8.8	-17.5	-27.4	13.6	-8.8	-17.5	-27.4	13.6	-10.8	-21.5	-33.5	13.6	-10.8	-21.5	-33.5
5:12	-8.8	-17.5	-27.4	13.6	-8.8	-17.5	-27.4	13.6	-8.8	-17.5	-27.4	13.6	-10.8	-21.5	-33.6	13.6	-10.8	-21.5	-33.6
6:12	-8.9	-17.6	-27.5	13.4	-8.9	-17.6	-27.5	13.4	-8.9	-17.6	-27.5	13.4	-10.9	-21.6	-33.6	13.4	-10.9	-21.6	-33.6
7:12	-9.9	-12.1	-12.1	13.3	-9.9	-12.1	-12.1	13.3	-9.9	-12.1	-12.1	13.3	-12.3	-14.9	-14.9	13.3	-12.3	-14.9	-14.9
8:12	-9.9	-12.1	-12.1	13.2	-9.9	-12.1	-12.1	13.2	-9.9	-12.1	-12.1	13.2	-12.3	-15.0	-15.0	13.2	-12.3	-15.0	-15.0
9:12	-10.0	-12.2	-12.2	13.1	-10.0	-12.2	-12.2	13.1	-10.0	-12.2	-12.2	13.1	-12.3	-15.0	-15.1	13.1	-12.3	-15.0	-15.1
10:12	-10.0	-12.2	-12.2	13.0	-10.0	-12.2	-12.2	13.0	-10.0	-12.2	-12.2	13.0	-12.4	-15.0	-15.0	13.0	-12.4	-15.0	-15.0
11:12	-10.1	-12.3	-12.3	12.8	-10.1	-12.3	-12.3	12.8	-10.1	-12.3	-12.3	12.8	-12.4	-15.1	-15.1	12.8	-12.4	-15.1	-15.1
12:12	-10.1	-12.3	-12.3	12.7	-10.1	-12.3	-12.3	12.7	-10.1	-12.3	-12.3	12.7	-12.5	-15.1	-15.1	12.7	-12.5	-15.1	-15.1
1:12	-12.1	-22.8	-36.1	15.1	-14.1	-26.5	-41.9	15.1	-14.1	-26.5	-41.9	15.1	-16.5	-30.7	-48.5	15.1	-16.5	-30.7	-48.5
2:12	-10.8	-21.5	-33.5	14.7	-12.6	-24.9	-38.8	14.7	-12.6	-24.9	-38.8	14.7	-14.7	-28.9	-44.9	14.7	-14.7	-28.9	-44.9
3:12	-10.8	-21.5	-33.5	14.3	-12.6	-24.9	-38.8	14.3	-12.6	-24.9	-38.8	14.3	-14.7	-29.0	-44.9	14.3	-14.7	-29.0	-44.9
4:12	-10.8	-21.5	-33.5	13.6	-12.6	-25.0	-38.8	13.6	-12.6	-25.0	-38.8	13.6	-14.8	-29.0	-45.0	13.6	-14.8	-29.0	-45.0
5:12	-10.8	-21.5	-33.6	13.6	-12.7	-25.0	-38.9	13.6	-12.7	-25.0	-38.9	13.6	-14.8	-29.0	-45.0	13.6	-14.8	-29.0	-45.0
6:12	-10.9	-21.6	-33.6	13.4	-12.7	-25.0	-38.9	13.4	-12.7	-25.0	-38.9	13.4	-14.8	-29.1	-45.0	13.4	-14.8	-29.1	-45.0
7:12	-12.3	-14.9	-14.9	15.4	-14.3	-17.4	-17.4	17.2	-14.3	-17.4	-17.4	17.2	-16.7	-20.2	-20.2	17.2	-16.7	-20.2	-20.2
8:12	-12.3	-15.0	-15.0	15.2	-14.3	-17.4	-17.4	17.1	-14.3	-17.4	-17.4	17.1	-16.7	-20.2	-20.2	17.1	-16.7	-20.2	-20.2
9:12	-12.3	-15.0	-15.0	15.1	-14.4	-17.5	-17.5	16.9	-14.4	-17.5	-17.5	16.9	-16.7	-20.3	-20.3	16.9	-16.7	-20.3	-20.3
10:12	-12.4	-15.0	-15.0	15.0	-14.4	-17.5	-17.5	16.8	-14.4	-17.5	-17.5	16.8	-16.8	-20.3	-20.3	16.8	-16.8	-20.3	-20.3
11:12	-12.4	-15.1	-15.1	14.9	-14.5	-17.5	-17.5	16.7	-14.5	-17.5	-17.5	16.7	-16.8	-20.4	-20.4	16.7	-16.8	-20.4	-20.4
12:12	-12.5	-15.1	-15.1	14.7	-14.5	-17.6	-17.6	16.6	-14.5	-17.6	-17.6	16.6	-16.9	-20.4	-20.4	16.6	-16.9	-20.4	-20.4
1:12	-14.9	-27.9	-44.1	15.1	-17.0	-31.5	-49.8	15.1	-17.0	-31.5	-49.8	15.1	-19.3	-35.8	-56.4	15.1	-19.3	-35.8	-56.4
2:12	-13.3	-26.3	-40.8	14.7	-15.1	-29.7	-46.1	14.7	-15.1	-29.7	-46.1	14.7	-17.3	-33.7	-52.3	14.9	-17.3	-33.7	-52.3
3:12	-13.3	-26.3	-40.9	14.3	-15.2	-29.8	-46.2	14.3	-15.2	-29.8	-46.2	14.3	-17.3	-33.8	-52.3	14.5	-17.3	-33.8	-52.3
4:12	-13.4	-26.3	-40.9	13.6	-15.2	-29.8	-46.2	13.6	-15.2	-29.8	-46.2	13.6	-17.3	-33.8	-52.3	13.9	-17.3	-33.8	-52.3
5:12	-13.4	-26.3	-40.9	13.6	-15.2	-29.8	-46.2	13.6	-15.2	-29.8	-46.2	13.6	-17.4	-33.8	-52.4	13.8	-17.4	-33.8	-52.4
6:12	-13.4	-26.4	-41.0	13.4	-15.3	-29.9	-46.3	13.4	-15.3	-29.9	-46.3	13.4	-17.4	-33.9	-52.4	13.7	-17.4	-33.9	-52.4
7:12	-15.1	-18.3	-18.3	17.9	-17.1	-20.8	-20.8	19.7	-17.1	-20.8	-20.8	19.7	-19.5	-23.6	-23.6	19.7	-19.5	-23.6	-23.6
8:12	-15.1	-18.4	-18.4	17.8	-17.2	-20.8	-20.8	19.6	-17.2	-20.8	-20.8	19.6	-19.5	-23.6	-23.6	21.7	-19.5	-23.6	-23.6
9:12	-15.2	-18.4	-18.4	17.7	-17.2	-20.9	-20.9	19.5	-17.2	-20.9	-20.9	19.5	-19.6	-23.7	-23.7	21.6	-19.6	-23.7	-23.7
10:12	-15.2	-18.4	-18.4	17.5	-17.3	-20.9	-20.9	19.4	-17.3	-20.9	-20.9	19.4	-19.6	-23.7	-23.7	21.5	-19.6	-23.7	-23.7
11:12	-15.2	-18.5	-18.5	17.4	-17.3	-20.9	-20.9	19.2	-17.3	-20.9	-20.9	19.2	-19.6	-23.8	-23.8	21.4	-19.6	-23.8	-23.8
12:12	-15.3	-18.5	-18.5	17.3	-17.3	-21.0	-21.0	19.1	-17.3	-21.0	-21.0	19.1	-19.7	-23.8	-23.8	21.3	-19.7	-23.8	-23.8

Up and Down (psf)

Side Load (psf)

California*

ASCE 7-05

85 mph
Basic Wind Speed

5 psf
Ground Snow Load

* This table is not inclusive of all areas within the state or region. The local wind speeds and snow loads should be independently verified for the specific install location.

Roof Pitch	Bldg. Height = 15 ft.						Bldg. Height = 30 ft.						Bldg. Height = 60 ft.					
	Up Pressures (psf)			Down (psf)			Up Pressures (psf)			Down (psf)			Up Pressures (psf)			Down (psf)		
	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3
	Exposure Category B																	
	Exposure Category C																	
	Exposure Category D																	
	Down Slope																	
1:12	0.3	0.6	0.8	1.0	1.2	1.3	1.3	1.3	1.9	2.1	2.5	2.5	2.5	2.5	2.5	3.2	4.0	4.8
2:12	0.6	0.9	1.1	1.3	1.5	1.7	2.3	2.3	2.3	2.5	2.8	3.6	3.6	4.3	5.2	3.6	4.3	5.2
3:12	0.9	1.2	1.4	1.6	1.8	2.0	2.6	2.6	2.8	3.2	3.2	3.9	3.9	4.6	5.5	4.2	4.9	5.8
4:12	1.2	1.5	1.7	1.9	2.1	2.3	2.8	2.8	3.1	3.4	3.4	4.2	4.2	4.9	5.8	4.0	4.8	5.7
5:12	1.5	1.7	1.9	2.2	2.3	2.5	3.1	3.1	3.3	3.7	3.7	4.4	4.4	5.1	6.0	4.6	5.3	6.2
6:12	1.7	2.0	2.2	2.4	2.6	2.7	3.3	3.3	3.5	3.9	3.9	4.6	4.6	5.3	6.2	5.1	5.8	6.6
7:12	1.9	2.2	2.4	2.6	2.8	2.9	3.5	3.5	3.7	4.1	4.1	4.8	4.8	5.5	6.3	5.2	5.9	6.6
8:12	2.1	2.4	2.6	2.8	3.0	3.1	3.7	3.7	3.9	4.2	4.2	4.9	4.9	5.6	6.5	5.3	6.0	6.7
9:12	2.3	2.5	2.7	2.9	3.1	3.3	3.8	3.8	4.0	4.4	4.4	5.0	5.0	5.7	6.5	5.5	6.2	6.9
10:12	2.5	2.7	2.9	3.1	3.3	3.4	3.9	3.9	4.1	4.5	4.5	5.1	5.1	5.8	6.6	5.7	6.4	7.1
11:12	2.6	2.8	3.0	3.2	3.4	3.5	4.0	4.0	4.2	4.6	4.6	5.2	5.2	5.9	6.6	5.8	6.5	7.2
12:12	2.7	2.9	3.1	3.3	3.5	3.6	4.1	4.1	4.3	4.7	4.7	5.3	5.3	6.0	6.7	5.9	6.6	7.3

Louisiana*

ASCE 7-05

120 mph

Basic Wind Speed

0 psf

Ground Snow Load

* This table is not inclusive of all areas within the state or region. The local wind speeds and snow loads should be independently verified for the specific install location.

Up and Down (psf)

Side Load (psf)

Roof Pitch	Bldg. Height = 15 ft.						Bldg. Height = 30 ft.						Bldg. Height = 60 ft.					
	Up Pressures (psf)			Down (psf)			Up Pressures (psf)			Down (psf)			Up Pressures (psf)			Down (psf)		
	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3
Exposure Category B																		
Exposure Category C																		
Exposure Category D																		
Down Slope																		

Up and Down (psf)

Side Load (psf)

Southwest*

ASCE 7-10

115 mph

Basic Wind Speed

5 psf

Ground Snow Load

* This table is not inclusive of all areas within the state or region. The local wind speeds and snow loads should be independently verified for the specific install location.

Southwest includes Arizona, New Mexico, Nevada and similar regions.

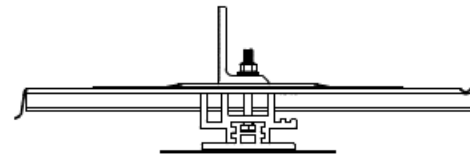
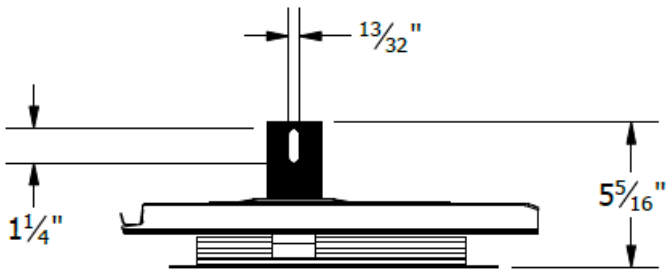
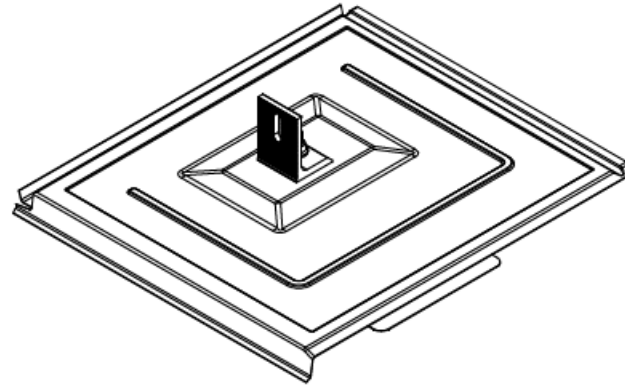
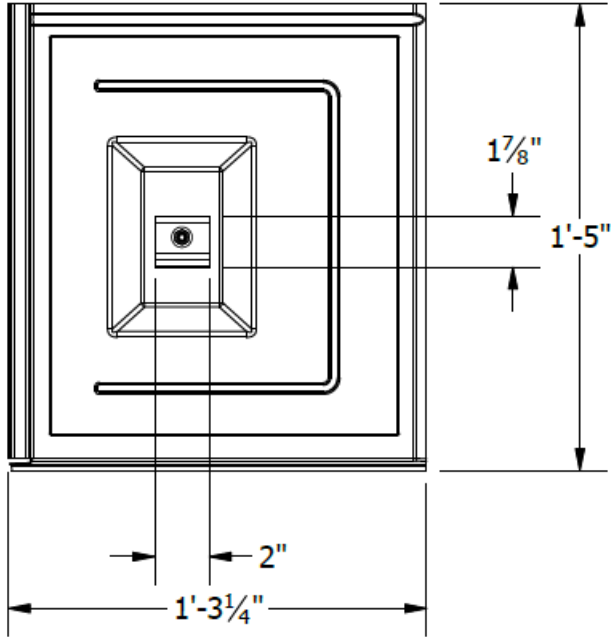
Roof Pitch	Bldg. Height = 15 ft.						Bldg. Height = 30 ft.						Bldg. Height = 60 ft.					
	Up Pressures (psf)			Down (psf)			Up Pressures (psf)			Down (psf)			Up Pressures (psf)			Down (psf)		
	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3
Exposure Category B																		
Exposure Category C																		
Exposure Category D																		
Down Slope																		

Up and Down (psf)

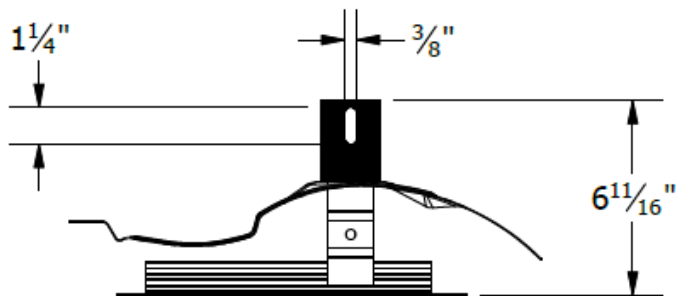
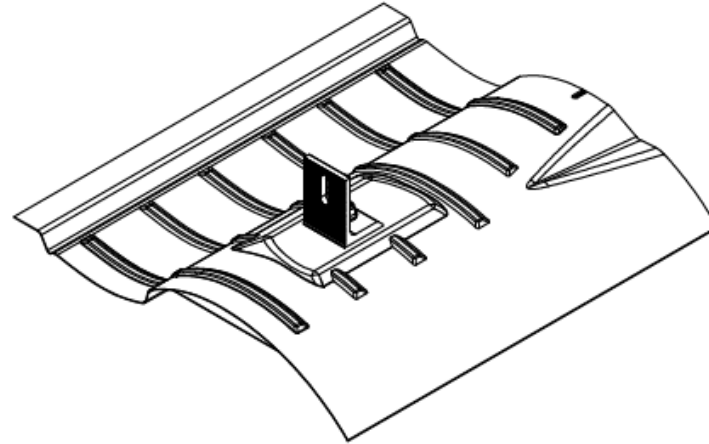
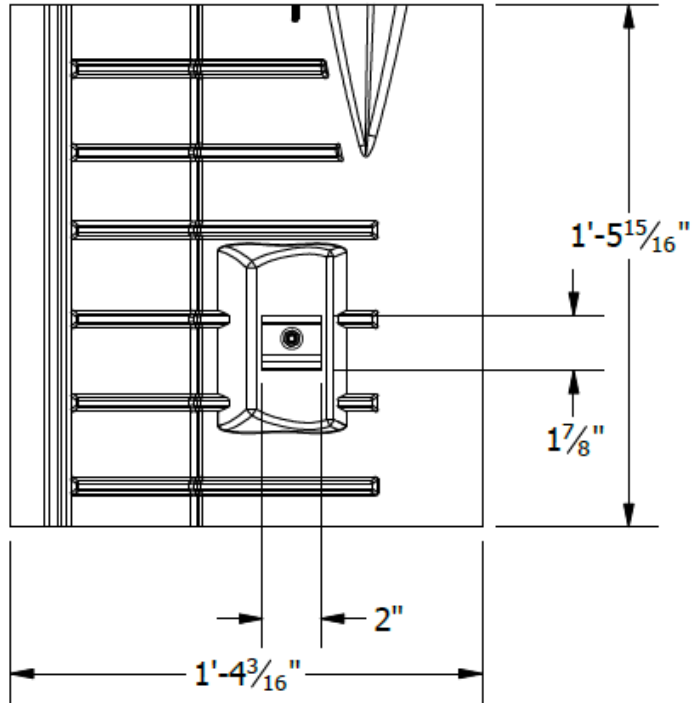
Side Load (psf)

Florida / Louisiana*
ASCE 7-10
176 mph
 Basic Wind Speed
0 psf
 Ground Snow Load

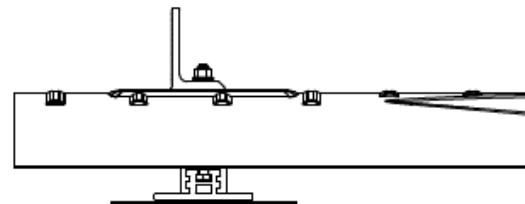
* This table is not inclusive of all areas within the state or region. The local wind speeds and snow loads should be independently verified for the specific install location.

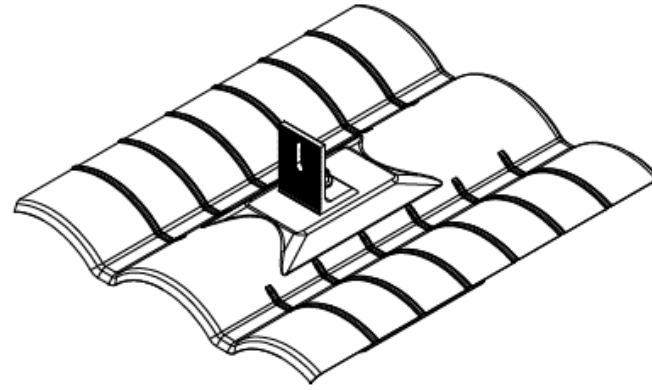
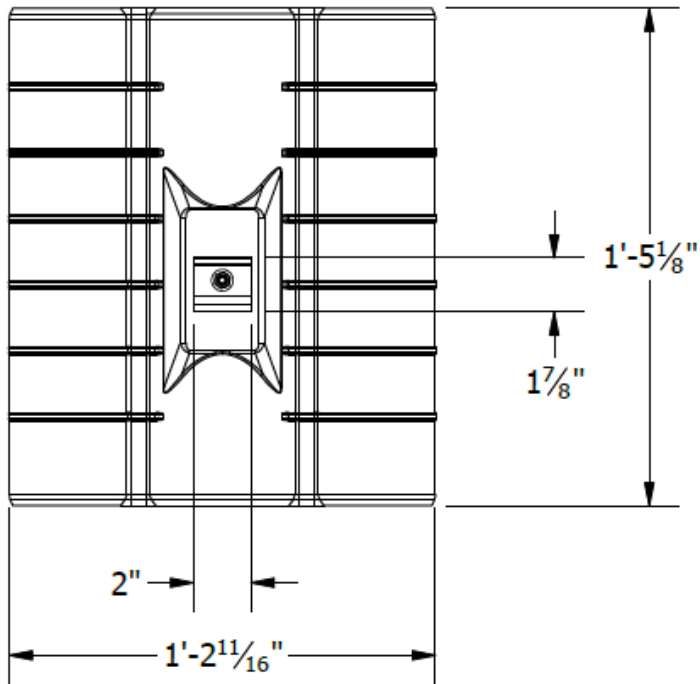


PART # TABLE	
P/N	DESCRIPTION
004TRFD	FLASHKIT TR FLAT-TILE CHARCOAL
004TRFM	FLASHKIT TR FLAT-TILE MILL
004TRFA	FLASHKIT TR FLAT-TILE ADOBE

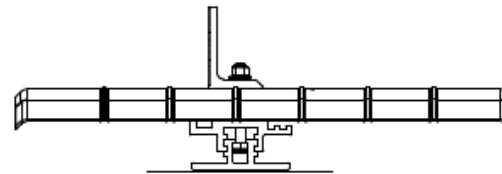
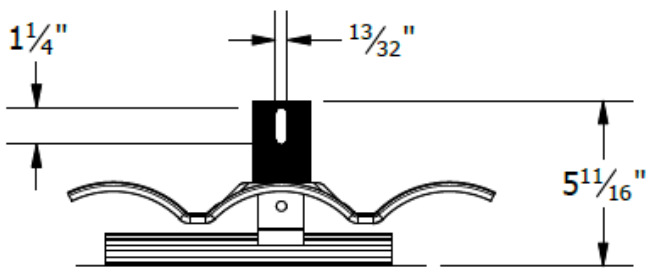


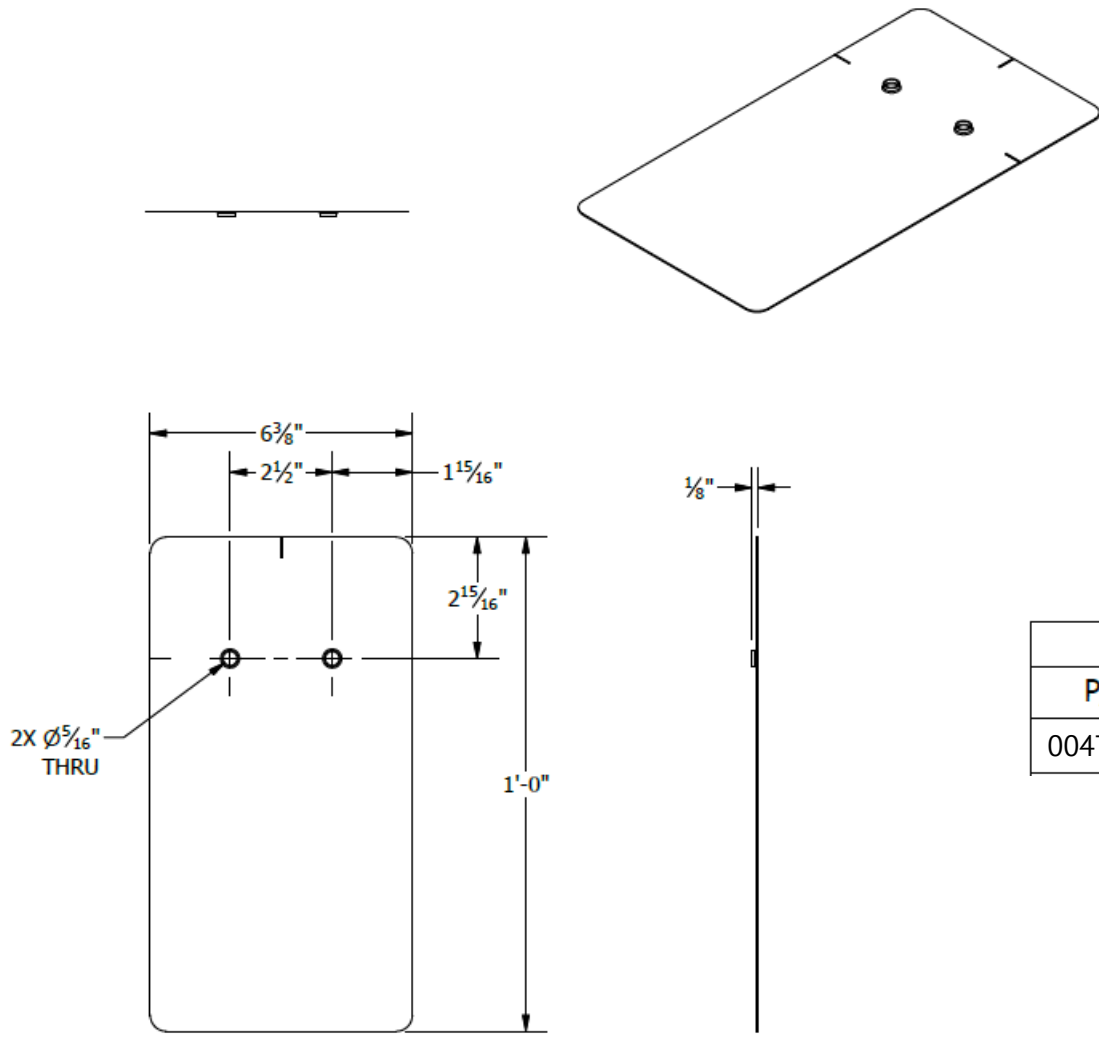
PART # TABLE	
P/N	DESCRIPTION
004TRSD	FLASHKIT TR SPAN-TILE CHARCOAL
004TRSM	FLASHKIT TR SPAN-TILE MILL
004TRSA	FLASHKIT TR SPAN-TILE ADOBE





PART # TABLE	
P/N	DESCRIPTION
004TRWD	FLASHKIT TR W-TILE CHARCOAL
004TRWM	FLASHKIT TR W-TILE MILL
004TRWA	FLASHKIT TR W-TILE ADOBE





PART # TABLE	
P/N	DESCRIPTION
004TRSF	TR UNIV SUB-FLASHING